

# Package ‘KLexp’

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**Title** Kernel\_lasso Expansion

**Version** 1.0.0

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**Description** Provides the function to calculate the kernel-lasso expansion, Z-score, and max-min-scale standardization. It can increase the dimension of existed dataset and remove abundant features by lasso. Z Dai, L Jiayi, T Gong, C Wang (2021) <[doi:10.1088/1742-6596/1955/1/012047](https://doi.org/10.1088/1742-6596/1955/1/012047)>.

**License** GPL-2

**URL** <https://github.com/Zongrui-Dai/Kernel-lasso-feature-expansion>

**Encoding** UTF-8

**RoxygenNote** 7.1.1.9001

**Depends** glmnet (>= 4.1-2)

**Imports** graphics, stats

**NeedsCompilation** no

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**Repository** CRAN

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gauss	<i>Gauss function</i>
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**Description**

Gauss function

**Usage**

```
gauss(d1, d2, sigma = 0.5)
```

**Arguments**

d1	vector1
d2	vector2
sigma	The hyperparameter of RBF kernel function, which indicates the width.

**Value**

Calculate the Gauss function

**Author(s)**

Zongrui Dai

**Source**

<https://github.com/Zongrui-Dai/Kernel-lasso-feature-expansion>

**Examples**

```
##  
data(iris, package = 'datasets')  
w<-gauss(iris[,1],iris[,2])  
print(w)
```

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kernel\_lasso\_expansion  
*kernel\_lasso\_expansion*

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## Description

Kernel\_lasso is one feature selection method, which combines the feature expansion and lasso regression together. Kernel function will increase the dimensions of the existed data and then reduce the features by lasso. 'glmnet' package should be higher than 4.1-2.

## Arguments

x	Your input features, which have to be data.frame with at least two variables.
y	The dependent variable
sigma	The hyperparameter of RBF kernel function, which indicates the width.
dataframe	Whether the data is dataframe. The default is TRUE
standard	Using 'max_min_scale' or 'Z_score' method to standardize the data. NULL means no standardization

## Value

The result is stored in one list which contains the original dataset, amplified dataset, final features, and lasso output.

## Author(s)

Zongrui Dai

## Source

<https://github.com/Zongrui-Dai/Kernel-lasso-feature-expansion>

## References

Z. Dai, J. Li, T. Gong, C. Wang (2021), Kernel\_lasso feature expansion method: boosting the prediction ability of machine learning in heart attack," 2021 IEEE. About Kernel-lasso feature expansion method: boosting the prediction ability of machine learning in heart attack" 2021 IEEE.

## Examples

```
##Regression (MSE)
data(attenu,package = 'datasets')
result<-kernel_lasso_expansion(x=attenu[,-c(3,5)],y=attenu[,5],
standard = 'max_min',sigma=0.01,control = lasso.control(nfolds=3,type.measure = 'mse'))
summary(result)

#Plot the lasso
```

```
plot(result$lasso)

#Result
result$original ##The original feature space
result$expansion ##The feature space after expansion
result$final_feature ##The name of the final feature
result$final_data ##The dataframe of final feature
```

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lasso.control

*lasso.control*

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### Description

The same function from glmnet, which controls the training of lasso.

### Usage

```
lasso.control(nfolds = 10, trace.it = 1, type.measure = "auc")
```

### Arguments

nfolds	n-fold cross-validation.
trace.it	Whether to plot the training process
type.measure	Choose the loss function.

### Value

Will return the lasso training setting

### Author(s)

Zongrui Dai

### Source

<https://github.com/Zongrui-Dai/Kernel-lasso-feature-expansion>

### Examples

```
##10-fold Cross-validation with MSE as loss function
c<-lasso.control(nfolds=10,type.measure='mse')
```

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max_min_scale	<i>max_min_scale</i>
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**Description**

max\_min\_scale is used to calculate the standardization value of data. The formula is  $(x - \min(x)) / (\max(x) - \min(x))$ . It can compress the data into the (0,1).

**Arguments**

data	Your input data, which can be numeric or data.frame
dataframe	Whether the data is dataframe. The default is False(numeric)

**Value**

Calculate the max-min standardization of the dataset by the formula:  $(\max(x) - x) / (\max(x) - \min(x))$

**Author(s)**

Zongrui Dai

**Source**

<https://github.com/Zongrui-Dai/Kernel-lasso-feature-expansion>

**Examples**

```
##For the numeric data
data(iris,package = 'datasets')
w<-max_min_scale(iris[,1])
print(w)

##For the data.frame data
w1<-max_min_scale(iris[,-5],dataframe=TRUE)
print(w1)
```

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Z_score	<i>Z_score standardization</i>
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**Description**

Z-score method is used to calculate the standardization value of data. The formula is  $(x - \text{mean}(x)) / \text{var}(x)$ . It can compress the data into the (0,1).

**Usage**

```
Z_score(data, dataframe = FALSE)
```

**Arguments**

`data` Your input data, which can be numeric or data.frame  
`dataframe` Whether the data is dataframe. The default is False(numeric)

**Value**

Calculate the Z\_score standardization of the dataset by the formula:  $(x - \text{mean}(x)) / \text{var}(x)$

**Author(s)**

Zongrui Dai

**Source**

<https://github.com/Zongrui-Dai/Kernel-lasso-feature-expansion>

**Examples**

```
##For the numeric data
data(iris,package = 'datasets')
w<-Z_score(iris[,1])
print(w)

##For the data.frame data
w1<-Z_score(iris[,-5],dataframe=TRUE)
print(w1)
```

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